DOCUMENT RESUME

ED 173 122 **SE 027 955**

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TITLE	The Effects of the Summer Institute: "New Career Options for Women Through Mathematics" on Mathematical, Social, Academic and Career Anxieties and on Sex Role Attitudes.
INSTITUTION	Arkansas Univ., Fayetteville. Dept. of Mathematics.
SPONS AGENCY	Rockefeller Foundation, New York, N.Y.
PUB DATE	78
NOTE	32p.; Contains occasional light and broken type
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Anxiety; Attitudes; *Career Opportunities; *Educational Research; Employment Potential; *Evaluation; Low Income Groups; *Mathematics Education; Postsecondary Education; *Sex Role; Summer Institutes; Workshops

ABSTRACT

An evaluative report is given on the Anxiety Management Training and Sex Role Workshops of the "New Career Options for Women through Mathematics" summer institute. The overall purpose was to help remedy the problems of low utilization of the scientific and technical academic and work potential of Arkansas women, and their resulting conditions of low job status and low-income level. The major emphasis of the institute was the development of mathematics skills. However, since anxiety was believed to be associated with the lack of self-confidence necessary to succeed academically (particularly in mathematics), Anxiety Management Training was included as an option available to participants. In addition, Sex Role Workshops were included for the purpose of raising awareness of possible attitudinal barriers to full realization of potential. (MP)

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The Effects of the Summer Institute: New Career Options for Women through Mathematics on Mathematical, Social, Academic and Career Anxieties and on Sex Role Attitudes

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Submitted to

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Funded by the Winthrop Rockefeller Foundation
Summer 1978

SE 027 955

INTRODUCTION

The following is an evaluative report on the Anxiety Management Training and Sex Role Workshops of the "New Career Options for Women through Mathematics" summer institute funded by the Winthrop Rockefeller Foundation. The overall purpose of the institute was to help remedy the problems of low-utilization of the scientific and technical academic and work potential of Arkansas women, and their resulting conditions of low job status and low-income level.

The major emphasis of the institute was the development of Mathematics skills. However, since anxiety was believed to be associated with the lack of self-confidence necessary to succeed academically (particularly in mathematics), Anxiety Management Training was included as an option available to participants. In addition, Sex Role Workshops were included for the purpose of raising to awareness possible attitudinal barriers to full realization of potential.

PROCEDURES

Subject Selection and Testing

Letters of invitation to participate in the summer institute were sent to approximately 1700 Arkansas high school Senior women who had selected the University of Arkansas as one of their top three schools of choice (ACT information section). The invitational letters described the institute's purpose in encouraging women to enter scientific and technical fields of study, and other specific offerings. It was emphasized that participants would receive six hours of mathematics credit at the university level, small group experiences and career counseling. Anxiety management training and sex role workshops were listed along with such additional enticements as computer skills training, scholarships, free books and hand-held calculators. High school teachers and counselors were also contacted and asked to encourage students to apply.

Potential participants requested over 500 application forms and 236 graduating high school women actually applied. Since only 90 positions were available in the project, it was necessary to select participants based on ACT scores, high school grades, and courses taken. High overall test scores and grades with an absence of adequate mathematics course work were selection criteria, since the object was to select women with high potential who were short in mathematics preparation. In summary, actual participation resulted from a combined process of student self-selection and programmer selection based on the student's potential and need.

Eighty-two of the ninety selected high school graduates attended the institute. The average ACT Composite score was 22, with the average ACT Mathematics score being 21. On the first day of attendance (mid-summer, 1978), pretests and class placement tests were given. For purposes of this study, and to be able to test for the effects of pretesting, a randomly selected half of the participants were given the Attitudes Toward Success, Social Situations and Mathematics Inventory (ASSM) (present authors, 1978)(see Table 1) and, a shortened version of the Attitudes Toward Women scale (Spence, 1973), (see Table 2). On the last day of the institute (six weeks later), subjects were again tested on these same inventories. In addition, for purposes of placement in mathematics class sections, the Mathematics Test A/3 (Mathematical Association of America, 1978) was given. In an orientation session, all participants were invited to take part for one and one-half hours once each week, in Anxiety Management Training (AMT)which was described as aiding with social anxieties as well as mathematical anxieties. Fifty-three persons signed up

Table 1. Attitudes Toward Success, Social Situations and Mathematics Inventory Items and Pretest Mean*

	Item	Pretest mean	n=37
1.	I am worried about the grade I will make when I enter the first semester of university or college work.	2.27	
2.	I am worried that I will not really be as competent as others if I enter a technical or scientific field of study.	2.11	
3.	When I imagine beginning a math exam I feel extremely anxious and unable to think clearly.	1.65	
4.	I feel confident that I will be successful.	1.11	
5.	When I have to meet new people I feel uneasy.	1.11	
6.	I am afraid that I will turn off interesting men if I am reasonably confident and assert myself.	.43	
7.	I feel that I have several good friends who would support me even if I blew it.	.41	
8.	I often feel anxious or tense.	2.08	

* The score is on a scale of 0 to 3 with the low end of the scale representing low degree of worry or anxiety.

Table 2. Attitudes Toward Women Items and Pretest Mean*

	Item	Pretest mean	n=37
1.	Swearing and obscenity is more repulsive in the speech of a woman than a man.	2.08	
2.	Under modern economic conditions with women being active outside the home, men should share in household tasks such as washing dishes and doing the laundry.	.41	
3.	It is insulting to women to have the "obey" clause remain in the marriage service.	1.65	
4.	A woman should be as free as a man to propose marriage.	1.62	
5.	Women should worry less about their rights and more about becoming good wives and mothers.	1.16	
6.	Women earning as much as their dates should bear equally the expense when they go out together	1.62	
7.	Women should assume their rightful place in business and all the professions along with men.	.43	
8.	A women should not expect to go to exactly the same places or to have quite the same freedom of action as a man.	.95	
9.	Sons in a family should be given more encouragement to go to college than daughters.	.08	
10.	It is ridiculous for a woman to run a locomotive and for a man to darn socks.	.73	

	Item	Pretest mean	n=37
11.	In general, the father should have greater authority than the mother in the bringing up of children.	.84	
12.	The intellectual leadership of a community should be largely in the hands of men.	.60	
13.	Economic and social freedom is worth far more to women than acceptance of the ideal of femininity which has been set by men.	1.41	
14.	There are many jobs in which men should be given preference over women in being hired or promoted.	1.24	
15.	Women should be given equal opportunity with men for apprenticeship in the various trades.	.41	

* Items developed by Janet Spence, 1963. The score is on a scale of 0 to 3 with the low end of the scale representing a low degree of traditional sex role attitude.

and gave a label for the anxiety with which they were concerned. Fourteen of these wrote that they needed to work on mathematics as well as social tension. The remainder were concerned with social and general anxieties. Thirty of the 53 decided not to participate in the sessions after their first day of mathematics classes due to their feelings of time pressure where the course work was concerned. Thus, only 22 women participated in AMT and only 10 of these happened to be pretested. Seven of the 22 had said they wanted to work on social and math anxiety. The remaining 15 described a variety of anxieties from "general social" to anxiety over being yelled at. The mean pretest Mathematics Test A/3 score for the 22 AMT participants was 12.91 and was 10.22 for non-participants.

Sex Role Workshops were held seven times during the six weeks for two hours each. All participants attended the first session, but again, all but 23 elected not to continue due to perceived time pressure. Of these 23, 12 were pretested. During the six weeks institute, all participants were exposed to mathematics course work, a Life Planning Workshop, sex career information sessions and group living. A few participated in individual and group counseling.

Anxiety Management Training

Subjects were divided into eight groups based upon their stated problem areas so that the group members in any one group had similar concerns. Group sizes ranged from three to six and were led by Psychology and Counselor Education graduate assistants and professional staff trained in Carkhuff's (1969) human relations and Jacobson's (1938) progressive relaxation techniques. In the first session, the specific reactions or concerns and their context were identified and discussed. In each of the following sessions, the group began with discussion of the problem area and led into desensitization procedures as described by Jacobson.

Sex Role Workshops

Seven two-hour sessions were held with all students taking part in the first session which topic was "Androgeny" and consisted of administration of the Bem scale (Bem, 1973), tabulation of individual scores and group means followed by discussions. The second session was focused on the film Women (Martha Stewart Productions) and the third was a session on values and sex roles as seen through a fable "The Alligator River Story". A speaker (Univer-

sity of Arkansas Sociology Department Chairperson) presented the fourth session "Sociological Perspectives on Women", and the fifth session involved small group discussions on the topic "Our Mother's and Father's Sex Role Commandments". The sixth session was again a film, Women's Work, concerning women in management (Martha Stewart Productions), and the seventh session was a presentation and discussion on the topic of assertiveness.

Method

Using an individual item analysis, no differences were found at the .05 level of significance for any single or collective set of items due to pretesting. Thus, groups which were pretested were combined with those which were not pretested in assessing the effects of self-selection for six sessions of AMT vs. no participation.

Since self-selection was involved, the possibility of differing beginning levels for the treatment groups was evident. Thus, though all means are presented in Tables 3 and 4, the statistical analysis was based upon the mean difference between the treatment and no-treatment groups where their change was concerned on each item. This form of analysis was used for testing the effects of both AMT and Sex Role Workshop participation. Each set of items was also tested using the MANOVA test criteria for the hypothesis of no overall effect.

Finally, the correlation coefficients of each item with each other item within and across inventories were found.

Table 3. Differences between Pre and Post test ASSM Item Means for Anxiety Management Training Self-Selected Participants and Non-Participants

ASSM Item Means for Participants				n = 10 on pretest		n = 22 on posttest			Overall Mean
Item	1.	2.	3.	4.	5.	6.	7.	8.	
Pretest Mean	2.50	2.40	1.90	1.00	1.30	.70	.60	2.20	1.575
Posttest Mean	2.46	2.05	1.64	.86	1.50	.77	.23	1.86	1.421
Difference	.04	.35	.26	.14	-.20	-.07	.37	.34	.154

ASSM Item Means for Non-Participants				n = 23 on pretest		n = 39 on posttest			Overall Mean
Item	1.	2.	3.	4.	5.	6.	7.	8.	
Pretest Mean	2.22	1.96	1.61	1.04	1.09	.44	.35	2.04	1.344
Posttest Mean	1.90	1.54	1.03	.84	1.18	.64	.49	1.80	1.178
Difference	.32	.42	.58	.20	-.09	-.20	-.14	.24	.166

Table 4. Differences between Pre and Post Test ATW Item Means for Sex Role Workshop Self-Selected Participants and Non-Participants.

ATW Item Means for Participants — n = 12 on pretest — n = 22 on posttest

Item	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	Overall Mean
Pretest Mean	2.00	.50	1.58	1.67	.92	1.25	.42	.75	.00	.92	.92	.50	1.00	1.25	.33	.934
Posttest Mean	1.59	.18	1.82	1.32	.73	1.36	.50	.73	.14	.73	.59	.50	1.27	.55	.23	.816
Difference	.41	.32	-.24	.35	.19	-.11	-.08	.02	-.14	.19	.33	.00	-.27	.70	.10	.118

ATW Item Means for Non-Participants — n = 29 on pretest — n = 53 on posttest

Item	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	Overall Mean
Pretest Mean	2.07	.41	1.62	1.62	1.21	1.62	.48	.97	.10	.59	.69	.59	1.48	1.21	.38	1.00
Posttest Mean	1.77	.45	1.89	1.47	1.09	1.40	.51	.96	.11	.76	.62	.60	1.21	1.23	.28	.95
Difference	.30	-.04	-.27	.15	.12	.22	-.03	.01	-.01	-.17	.07	-.01	.27	-.02	.10	.04

RESULTS

AMT Participation

Differences at the .05 level of significance, in change scores between AMT participants and non-participants were found on three of the eight AMT items (see Table 5). These items were:

1. I am worried about the grade I will make when I enter the first semester of university or college work ($F=7.35$, $p<.009$).
2. I am worried that I will not really be as competent as others if I enter a technical or scientific field of study ($F=5.27$, $p<.025$).
3. When I imagine beginning a math exam I feel extremely anxious and unable to think clearly ($F=6.72$, $p<.012$).

As can be seen in Table 3, the greater change was for non-participants over self-selected participants. See Table 5 for the remaining statistical AMT item findings. Wilk's criterion showed no overall effect for these items at the .05 level of significance ($F=1.64$, $p<.14$). Table 3 shows a slight tendency for Anxiety Management Training participants to begin (at pretest) with overall greater worries and anxieties than non-participants and overall, for there to be a small change in the positive direction for both groups in reducing those anxieties (as reported above, there was no statistically significant overall change of one group over the other). The greatest changes for participants were on items 7) in gaining a feeling of having supporting friends in spite of possible failure, 2) gaining confidence in feeling as competent as others in entering technical or scientific fields of study, and 8) reducing the frequency of feeling anxiety and tension, while the greatest changes for non-participants were on items 3) in overcoming anxiety in taking mathematics exams, 2) gaining confidence in feeling as competent as others in entering technical or scientific fields of study, and 1) overcoming worrying about college grades.

The mean posttest Mathematics Test A/3 score was 21.41 for AMT participants and 19.21 for non-AMT participants, showing an average mathematics competency gain of 8.50 points for AMT participants relative to an average gain of 8.99 points for non-AMT participants (see Table 6). Three persons dropped out of the summer institute. They were all non-AMT participants.

Table 5. Test for difference between AMT Group and no AMT Group in Change on each item

Item	Source	DF	SS	F Value	PR < F
1	ACT	1	4.37	7.35	.009
2	ACT	1	3.99	5.27	.025
3	ACT	1	5.25	6.72	.012
4	ACT	1	0.00	0.01	.9311
5	ACT	1	1.45	1.60	.211
6	ACT	1	0.35	0.48	.493
7	ACT	1	0.77	1.65	.204
8	ACT	1	0.01	0.01	.905

Sex Role Workshop Participation

For the Sex Role Workshops, no differences at the .05 level of significance were found in change scores between participants and non-participants on the Attitudes Toward Women (ATW) scale except on item 14 which reads: There are many jobs on which men should be given preference over women in being hired or promoted ($F=6.51$, $p<.016$). Participants made greater change on item 14 than did non-participants (see Table 4). No overall effect of Sex Role Workshop participation was found over non-participation at the .05 level of significance (Wilk's Criterion, $F=.61$, $p<.85$).

By comparing the ATW pretest scores for Sex Role Workshop participants and non-participants in Table 4, it is apparent that both groups began with approximately the same overall attitudes. However, those who self-selected to take part in the workshop appear to be somewhat more on the side of believing that they should "worry--(more) about their rights and--(less) about being good wives and mothers" (item 5) than were the non-participants. The participants also were somewhat more in favor of women sharing equally in expenses when dating (item 6), having equal freedom of action (item 8), and felt that the ideal of economic and social freedom was worth more than the traditional ideal of femininity (item 13) to a somewhat greater degree than did non-participants. However, though neither group tended to go along with the idea that it would be "ridiculous for a woman to run a locomotive and a man to darn socks" (item 10), non-participants tended most to disagree with that statement.* Otherwise, there appeared to be a tendency for both groups to change toward less traditional sex role attitudes on item 1 (swearing and obscenity--in the speech of a woman versus a man), and for participants to move in the direction of believing that men should share on household tasks (item 2), that women should be equally free to propose marriage (item 4) and that mothers and fathers should share authority on bringing up children (item 11). The outstanding change was on item 14 for participants where, as reported above, their change was significantly greater than was that of non-participants.

*No statistical tests were run on the differences among these pre-test scores.

Table 6. Mathematics Test A/3* Mean Score for AMT Participants and Non-AMT Participants

	Pretest n	Pretest $\bar{X}$	Posttest n	Posttest $\bar{X}$	$\bar{X}$ Gain
AMT Participants	22	12.91	22	21.41	8.50
AMT Non-Participants	59	10.22	56	19.21	8.99

*Mathematical Association of America, Copyright 1978.

Relationships Among Items

Several items of the ASSM inventory were found to intercorrelate on the pretest at ($p < .05$) level of significance (see Table 7). Items 1 and 2 concerning worry about grades and worry about potential self-competence in scientific and technical fields of study were significantly related ($r = .46$) while the latter item (2) also was significantly related ($r = .42$) to feeling extremely anxious and unable to think clearly in a mathematics exam (3). Item 3 was, in turn, significantly related ($r = .37$) to general anxiety and tension (8).* Confidence (or lack of confidence) in success (4) was related at $p < .05$ to no other item, and feeling uneasy when meeting people (5) was only related ($r = .37$) to being afraid of "turning off" interesting men by being confident and self-assertive (6). The latter item was also significantly related ($r = .54$) to the fear of loss of the support of good friends at times of failure (7) and to general anxiety and tension (8), ($r = .37$).

Thus, two separate clusters of items appeared, one concerning academic and career competence worries with math anxiety, and the other cluster concerning social unease, lack of confidence and fear of rejection. Both clusters were associated with general anxiety and tension.

Few of the ASSM items were found to correlate significantly ($p < .05$) with the ATW items. In fact, the sparse number of significant correlations (four in a possible 120, all between $p < .01$ and $p < .05$ level of significance) were very near, and slightly fewer, than those relationships to be expected by chance (see Table 8). However, the first relationship found was from item ASSM 3 concerning extreme math anxiety to item ATW 10 concerning the ridiculousness of a woman running a locomotive and a man darning socks. Believing that good friends would provide support if failure should occur tended to decrease when there was an increase in the feeling that it was insulting to a woman to leave the obey clause in the marriage service, while an increase in the belief in supportive friends was positively related to the idea that sons and daughters should be equally encouraged to go to college. Finally, low general anxiety and tension was found to relate positively to the idea that women should assume their rightful places in business and profession along with men (and, of course, the reverse: high general anxiety was positively related to the idea that they should not).

*I have stated all of these in the negative, in order to reduce complications in communication, though of course they may have been stated as well in the positive.

Table 7. Attitudes Toward Success, Social Situations and Mathematics Inventory Item Intercorrelations*

Pretest

Item	1	2	3	4	5	6	7	8
r	1	1.00	.46					
p<			.004					
r	2		1.00	.42				
p<				.010				
r	3			1.00				.37
p<								.024
r	4				1.00			
p<								
r	5					1.00	.37	
p<							.022	
r	6						1.00	.54	.37
p<								.001	.024
r	7							1.00	
p<									
r	8								1.00
p<									

*Showing only those correlations of $p < .05$ level of significance.

Table 8. Cross Inventory Correlations Using the Attitudes Toward Success, Social Situations and Mathematics Inventory and the Attitudes Toward Women Scale (ATW)*.

ASSM Items		ATW 1	ATW 2	ATW 3	ATW 4	ATW 5	ATW 6	ATW 7	ATW 8	ATW 9	ATW 10	ATW 11	ATW 12	ATW 13	ATW 14	ATW 15
r																
p <	1															
r																
p <	2															
r											.34					
p <	3										.039					
r																
p <	4															
r																
p <	5															
r																
p <	6															
r				-.38						.36						
p <	7			.020						.031						
r								.36								
p <	8							.028								

*Showing only those correlations of $P < .05$ level of significance.

Several pretest intercorrelations were found within the ATW scale (see Table 9). The only negative correlation was from item 1, concerning the relative repulsiveness of women versus men when swearing, to item 15, concerning equal opportunity for men and women for apprenticeships in various trades (r=-.42). Thus, those who felt that women were more repulsive when swearing, tended also to say that women should be given equal opportunities for apprenticeships. The latter concept (item 15) was positively correlated (r=.37) with the concepts of women sharing cost with dates (item 6, r=.37), equality in freedom to go places and of action (item 8, r=.39), and equality in promotion and hiring for men and women (item 14, r=.37).

This cluster of items, then, seemed to reflect the relationship between attitudes concerning certain personal standards of conduct for women versus men, and attitudes concerning equality in training and hiring opportunities.

Items 12 (concerning equality in community leadership) and 7 (concerning women assuming their rightful place in business and professions) were found to correlate significantly (r=.34) with one another and with more other ATW items than did any of the other items. Many of their intercorrelations were found to be the same. Looking at item 12 first, it was found to relate positively* to the attitudes of freedom for women in proposing marriage (item 4, r=.40), sharing costs with dates (item 6, r=.37), equality of family encouragement to sons and daughters to attend college (item 9, r=.36), and absence of ridicule to women in running locomotives or to men darning socks (item 10, r=.36). Item 12 was also found to relate positively (r=.36) to the attitude that economic and social freedom is worth more to women than the male ideal of feminity (13). Finally, the concept of equality in community leadership (12) was related most significantly (and well above all of the other relationships) to the concept of shared authority on bringing up children (item 11, r=.53). Thus, this cluster of items seems to have, at its center, the concept of equality in the home from which springs concepts of developmental opportunity (social, academic, and career), and ultimately, equality in leadership of the broader community.

Item 7 (concerning women assuming their rightful place in business and the professions) was found to significantly relate ($p < .05$), as stated above, to many of the same items as was 12 (though item 7's relationships appeared to be somewhat tighter) (See Table 9).

* Item 12, of course, also relates to all of the items listed when item 12 and they are all stated in reverse.

Table 9. Attitudes Toward Women Item Intercorrelations.

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
r	1.00														-.42
p < 1															.008
r		1.00			.38		.41				.52				?
p < 2					.020		.012				.001				
r			1.00	.47	.42										
p < 3				.003	.010										
r				1.00	.43		.36				.44	.40			
p < 4					.007		.027				.006	.015			
r					1.00										
p < 5															
r						1.00	.56					.37	.37		.37
p < 6							.000					.023	.025		.024
r							1.00		.56	.49		.34		.44	
p < 7									.000	.002		.037		.006	
r								1.00							.39
p < 8															.017
r									1.00			.36			
p < 9												.029			
r										1.00		.36		.48	
p < 10												.030		.003	
r											1.00	.53			
p < 11												.001			
r												1.00	.36		
p < 12													.029		

13.

Table 9 (Continued)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
r/P < 13													1.00		
r/P < 14														1.00	.37 .026
r/P < 15															1.00

*Showing only those correlations of $P < .05$ level if significance

Item 7, unlike 12, however, was found to significantly relate to item 14 (r=.44), concerning equality for men and women in promotion and hiring, and to a belief in men sharing in household tasks (item 2, r=.41).

On the other hand, the belief in equality in community intellectual leadership (12) was found to be closely related to the belief in mother and father shared authority in bringing up of children (11), and to the attitude that economic and social freedom is worth more than the male ideal of femininity (13), while the former concept (7) was not. Thus, the shading of difference between these two sets of items seems to have to do with practical concerns about sharing in household tasks and equality in hiring and promotion, tied to a belief in equality in business and the professions, rather than concerns about shared authority on rearing children and the ideal of femininity, tied to the concept of equality in intellectual leadership of the community.

One small cluster of items seemed to have at its center a sense of justice and personal insult (or afront) at its absence (again, the opposite on this continuum - a missing sense of justice and lack of personal outrage at its absence - balances out the cluster). Here item 5, "Women should worry less (more) about their rights and more (less) about becoming good wives and mothers", was most highly related (in the same logical direction) to a belief in freedom for women to propose marriage (item 4, r=.43) and also related to the idea that it is insulting to women to have the "obey" clause in the marriage service (item 3, r=.42). Items 3 and 4 were also found to closely relate to one another (r=.47). Finally, item 5 also related significantly to the concept that men and women should share equally in household tasks (item 2, r=.38).

Only two sets of relationships remain which have not fallen into any of the above clusters. The first is a strong relationship which probably speaks for itself between item 10 ("it is ridiculous for a woman to run a locomotive and for a man to darn socks"), and item 14 ("There are many jobs on which men should be given preference over women in being hired or promoted"), (r=.48). The second set seemed to conceptually center around item 13, which concerned the importance of the concept of economic and social freedom as weighed against teh ideal of femininity. Item 13 then, was found to relate to the concept of bearing equally in expenses with dates (item 6, r=.37), and to the belief in equality in intellectual leadership in the community (item 12, r=.36). These two latter attitudes were in turn related to one another (r=.37).

DISCUSSION

The first finding, that non-participants in the AMT sessions made greater gains than participants in overcoming worry about grades and future competence, and in overcoming math anxiety, has to be understood through knowledge of the nature of the entire group of participants, the effects of the self-selection process, and the differential effects of the entire summer institute on these sets of students.

As has been realized for some time, human services programs, which cannot and should not exclude nature's flux and change, are often extremely difficult to evaluate for that very reason. Traditional scientific methods ideally demand that strict controls be placed on possible contaminating influences, yet, for the actual success of our program, we wished to involve as many (believed to be) positive "contaminating" events as possible while being flexible enough to allow individuals the chance to to gauge their activity by their perceived time pressure. Thus, many independent variables were present while "experimental" and "control" subjects were self-selected to be exposed for greater periods of time to those variables, which for them had the greatest appeal, rather than allowing us to randomly select them as experimental subjects. Still, we felt a need to attempt, in spite of the complexity, to measure what happened to the various subgroups of participants who, through a process involving many internal fears, beliefs, desires and external relationship pressures, sorted themselves out for certain learning experiences.

Perhaps it will be helpful to point out that, in contrast to many current programs for "Math Anxiety", ours was not focused on helping the extreme cases of mathematics anxiety, but rather on helping those persons who appeared to be of high potential but who, for possibly traditional attitudinal reasons, had missed out on the appropriate academic experiences for study in the scientific and technical areas. Thus, all students who eventually took part in the AMT sessions were concerned with social anxieties and less than a third also mentioned mathematics anxiety as a secondary concern. In fact, these students actually began the institute with a somewhat higher entrance exam score than did those who selected not to participate in AMT.

In looking more closely at the effects of the self-selection process, the most obvious outcome is that all interpretations of statistical findings have to be qualified due to the low number of experimental subjects. This number is particularly low on the pretests where the number was cut in half in order to be able to test for the effects of pretesting (a procedure, as it turns out, which indicated that there were no such effects). As a result of this,

change scores for non-participants (where the numbers were more than doubled) were found to be statistically significant over participants when similar difference scores for participants (see Item ASSM 7) were not. Thus, in discussing the participant findings, understanding of the various interactions will probably be most benefitted through scrutiny of the actual individual item means with reference to trends which require further testing.

We can, however, discuss with greater statistical certainty the findings where non-participants are concerned. These individuals did participate (as did all subjects) in six hours of university-level mathematics course work, and in weekly career development sessions. Thus, those students who chose not to take part in AMT made greater gains than participants in reducing mathematics anxiety (item 3), possibly due to the differential effects of gaining skill competencies for those persons who do not experience themselves as anxious to the point of needing remediation versus those persons who do. Both groups of subjects revealed improvement in their anxiety concerns following the summer institute.

Non-participants dropped from being half-way between "agree--" and "disagree mildly", to "disagree mildly" on the mathematics anxiety statement (item 3). AMT participants, on the other hand, began with somewhat greater (.29) reported anxiety and finished the program at approximately the same mean as had the non-participants when they began. Thus, AMT appeared to be successful in bringing those persons who saw themselves as needing remediation to the same point as those who did not feel such need (at least who did not invest their time and energy in the AMT program). There appeared to be a similar positive tendency for changes to be made by both groups on the general anxiety item (8) with participants making somewhat greater gains.

Those who selected not to participate in AMT made significantly greater gains than participants in reducing their worry about first semester university grades (item 1), possibly due to the differential effects of actual skill and competency gains for self-identified anxious versus non-anxious persons. That is, persons who experience anxiety often tend to do so in relation to cognitive thought ("worry") habits which continue in spite of reduced internal or external cause for that habit. Thus, the theoretical long-term benefits of reduced emotionality (anxiety) in changing participants' self-beliefs (performance worry), were not seen, at least at the end of this six week period, whereas such benefits were seen for persons who reduced anxiety but did not see themselves as needing to do so in the first place. In other words, since non-participants began with fewer worry habits (compare the two groups' pretest scores in

items 1 and 2), they were able to make greater gains in reducing anxiety through skill gains than were AMT participants and even reduced further their worries than did the self-identified anxious student.

The above suggestion of emotional-cognitive relationship is supported by the intercorrelations found among the ASSM items on the pretest. Item 2 concerning future science and technical academic competence worry was found to significantly relate to worry about general first semester grades and to matnematics anxiety. Thus, at the completion of six hours of mathematics course work, the improvement in mathematics competencies was found to correspond to reduction in mathematics anxiety (with or without need for or provision of AMT), and both processes were in correspondence with an increase in confidence in entering scientific and technical fields of study, a basic premise for the development of this institute.

As to the remaining ASSM items, little or no change was found for either group as a result of the summer institute in gaining confidence in future success, in feeling at ease in meeting new people, or in believing in the success of self-assertion in dealing with men. The "success" item may simply have been too general for the women to relate to their institute experiences, and was, like the other two, tending to begin with little room for improvement. However, participants did manage to improve on Item 7 so that by the end of the summer they were very near complete agreement with the statement, "I feel that I have several good friends who would support me even if I blew it". Their tendency toward a positive direction with this item and non-participants' slightly negative directions suggests that the sought-out small group experience led to greater feelings of loyal friendship or support than did the classroom experience.

Sex Role Workshops

Due to the low number of pretested Sex Role Workshop participants, clarity was not achieved (through statistical tests) as to the workshops' effectiveness where most of the observed shifts in mean scores were concerned. However, the statistical tests were helpful in defining the limitations in change where the more numerous non-workshop participants were concerned. The results indicate that an increase in mathematics competency and attendance at career information sessions do not, at least in a six week period, affect sex role attitudes. However, these experiences, in combination with workshops designed to increase awareness, do show some tendencies (for the most part not statistically apparent)

to affect attitudinal directions. Certainly the major shift toward endorsing equality in promotion and hiring would seem to reflect what was a point of emphasis throughout the workshops and to some extent in the career information sessions. At least in these latter sessions (attended by all students), women "role models" presented themselves from traditionally male dominated fields. Thus, it is particularly interesting that Sex Role Workshop non-participants remained at a quarter of the way ($\bar{x}$=1.23) toward agreeing mildly (from disagreeing mildly) with the unequal preference statement, while participants moved from that same position to being half-way ($\bar{x}$=.55) between disagreeing mildly and disagreeing strongly (the lowest possible choice on the scale). Thus, it would appear to be necessary to include educational programs which provide direct examples and work to develop full intellectual understanding of the economic and social outcomes of inequality versus equality, if attitudes are to be affected. In other words, competent and career-wise well-informed women may maintain sexist attitudes given the major conditions of our society. It is also interesting to note that the remaining items which showed a tendency to change for participants were intercorrelated (2 and 4 each with 11) on the pretest in the cluster of items which appeared to center around the concept of equality in the home. Thus, the workshops' efforts in the areas of domestic relationships and the workability of alternate lifestyles seems to have influenced at least some participants' approach to these issues.

In looking at items which showed little change with program intervention, it can be seen that on the pretest these young women uniformly disagreed with the notion that sons should be given more encouragement to go to college than daughters (item 9). Thus (since the items' ceiling had been reached), no positive change was possible on this subject which was so relevant to their current life experience. These subjects also began the institute with the belief that, "Women should assume their rightful place in business and all the professions along with men", (item 7). Perhaps the positive wording of the statement and its generality led to the common agreement. Finally, these subjects also left little room for improvement on Item 5 concerning belief in equal opportunity for apprenticeships in various trades, and on Item 12 concerning belief in equality of intellectual leadership in the community. The common agreement among students in the same direction on items 7, 9 and 12, for the most part explains statistically their high intercorrelations.

Four of the 15 attitudinal statements showed no tendency toward improvement for either group though such improvement would have been statistically possible. The students did not change their opinion where the "obey" clause

in the marriage service was concerned (item 3), on cost sharing on dates (item 6), on equality in freedom of action (item 8),or on the subject of economic and social freedom versus the male ideal of femininity (item 13). The latter three items were intercorrelated on the pretest and all seem to have to do with gaining secure and loved positions by virtue of adherence or obedience to protected or even submissive rules of behavior. It is this trade-off, then, which appears to be most difficult to confront. The reason for the difficulty may be that at some level, not fully conscious, many of these subjects (if not most of us) fear to break away from known routes to these psychologically necessary conditions.

Item Intercorrelations

A few comments seem to be in order where item intercorrelations are concerned. One of the most important findings had to do with the lack of consistency of associations between anxieties having to do with academic concerns and those concerning social fears, and the lack of consistent association of either type fear to sex role attitudes. In other words, traditional or more liberated attitudes may or may not be accompanied by anxiety of either sort. Thus, with few possible exceptions (Table 7), there was little to confirm the notion that social anxieties or worry about university grades, future competency in scientific fields of study or mathematics anxiety, lead to, or interact with, more traditionally feminine attitudes. Quite possibly, however, if the subjects of this study were more representative where the broader range of mathematics and social anxieties were concerned (these subjects, it will be remembered, were selected in part for their general success in high school), some relationships might be found among the dimensions. These findings suggest, that, for the middle and upper range student, however, anxieties may focus on academic and/or social concerns with non-specific anxiety or tension (item 8) accompanying that focus.

Exceptions to the above statements where anxiety is concerned were that among women of middle to upper range ability, agreement with ridicule of women in traditional male roles (ATW10) was related moderately to math anxiety (ASSM3) and that reduced general anxiety was moderately related to a belief in women assuming "their rightful places in business and profession along with men" (ATW7). Though both of these relationships would seem to provide some suggestion of mutual influence, caution should be used in drawing conclusions since many other potential relationships in this data, which would

appear to have similar meaning, were not found.

Finally, certain interesting correlations were found within the ATW scale. Here, several relationships suggested that standards for personal freedom of action or choice are interrelated with belief in equal access to training, jobs and advancement. Perhaps overcoming fears involved in taking personal life risks leads to desire for the rewards intrinsic to direct involvement in the world.

Interestingly, women who hold the above constellation of beliefs, tend to reject the equality of women and men where less savory aspects of general male behavior are concerned (i.e. verbal obscenity), while those who tend to believe in less equality of worldly involvement for women tend also to believe that women should be viewed equally with men where verbal obscenity is concerned. One explanation may be that the more traditional sex role view is tied in with moralistic or religious teachings which may, in turn, emphasize the wrongness of verbal obscenity as applied to anyone. Thus, those less schooled in traditional views feel it's alright for men, anyway, to curse!

Another set of relationships suggested the importance of parental and brother-sister equality to later belief in equal opportunity and male-female shared community leadership roles. Specifically, those supporting equality in business and the professions seemed to support some areas which may be termed more practical, or, which may simply be more overt and measureable (equality in hiring and promotion and shared household tasks) than were the concerns of persons favoring equality in intellectual leadership of the community. The latter concept was related, as will be remembered, to concepts concerning the ideal of feminity and shared authority in bringing up children. The finding that attitudes toward practices within the home between men and women closely related to attitudes concerning rights and equality in the world suggests, as might have been expected, that early childhood experiences relevant to parental interactions are highly relevant to the development of concepts of justice and equality.